

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 40V           | 8mΩ@10V         | 45A   |
|               | 10mΩ@4.5V       |       |



**合肥矽普半导体**

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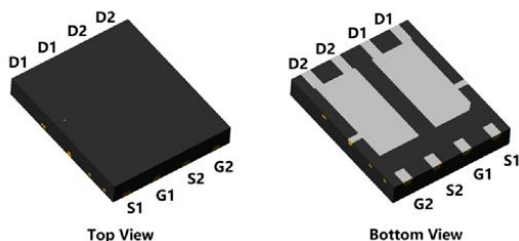
## Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

## Applications

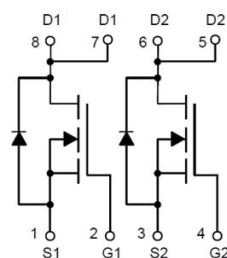
- DC-DC Converters.
- Motor Control.

## Package

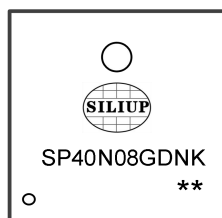


PDFN5X6-8L

## Circuit diagram



## Marking



SP40N08GDNK  
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:Device Code  
:Week Code

## Order Information

| Device      | Package    | Unit/Tape |
|-------------|------------|-----------|
| SP40N08GDNK | PDFN5X6-8L | 5000      |

**Absolute maximum ratings (Ta=25°C unless otherwise noted)**

| Parameter                                   | Symbol          | Rating     | Unit |
|---------------------------------------------|-----------------|------------|------|
| Drain-Source Voltage                        | $V_{DS}$        | 40         | V    |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$   | V    |
| Continuous Drain Current(Tc=25°C)           | $I_D$           | 45         | A    |
| Continuous Drain Current(Tc=100°C)          | $I_D$           | 30         | A    |
| Pulse Drain Current                         | $I_{DM}$        | 180        | A    |
| Power Dissipation(Tc=25°C)                  | $P_D$           | 40         | W    |
| Single pulsed avalanche energy <sup>1</sup> | $E_{AS}$        | 110        | mJ   |
| Thermal Resistance Junction-to-Case         | $R_{\theta JC}$ | 3.125      | °C/W |
| Storage Temperature Range                   | $T_{STG}$       | -55 to 150 | °C   |
| Operating Junction Temperature Range        | $T_J$           | -55 to 150 | °C   |

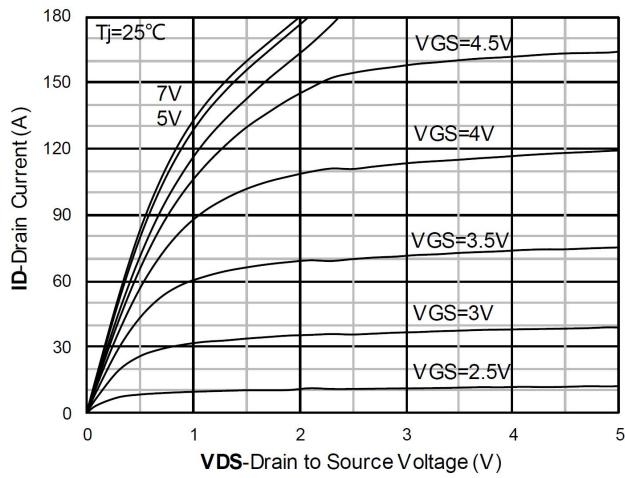
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

| Parameter                             | Symbol            | Conditions                          | Min. | Typ. | Max. | Unit |
|---------------------------------------|-------------------|-------------------------------------|------|------|------|------|
| Static Characteristics                |                   |                                     |      |      |      |      |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub> | VGS=0V , ID=250uA                   | 40   | -    | -    | V    |
| Drain-Source Leakage Current          | IDSS              | VDS=32V , VGS=0V , TJ=25℃           | -    | -    | 1    | uA   |
| Gate-Source Leakage Current           | IGSS              | VGS=±20V , VDS=0V                   | -    | -    | ±100 | nA   |
| Gate Threshold Voltage                | VGS(th)           | VGS=VDS , ID =250uA                 | 1    | 1.5  | 2.5  | V    |
| Static Drain-Source On-Resistance     | RDS(ON)           | VGS=10V , ID=30A                    | -    | 8    | 10   | mΩ   |
|                                       |                   | VGS=4.5V , ID=20A                   | -    | 10   | 13   |      |
| Dynamic characteristics               |                   |                                     |      |      |      |      |
| Input Capacitance                     | Ciss              | VDS=20V , VGS=0V , f=1MHz           | -    | 625  | -    | pF   |
| Output Capacitance                    | Coss              |                                     | -    | 311  | -    |      |
| Reverse Transfer Capacitance          | Crss              |                                     | -    | 21   | -    |      |
| Total Gate Charge                     | Qg                | VDS=20V , VGS=10V , ID=20A          | -    | 17   | -    | nC   |
| Gate-Source Charge                    | Qgs               |                                     | -    | 4.9  | -    |      |
| Gate-Drain Charge                     | Qgd               |                                     | -    | 8.6  | -    |      |
| Switching Characteristics             |                   |                                     |      |      |      |      |
| Turn-On Delay Time                    | Td(on)            | VDD=20V , VGS=10V , RG=1.6Ω, ID=20A | -    | 3.5  | -    | nS   |
| Rise Time                             | Tr                |                                     | -    | 58   | -    |      |
| Turn-Off Delay Time                   | Td(off)           |                                     | -    | 22   | -    |      |
| Fall Time                             | Tf                |                                     | -    | 2.6  | -    |      |
| Diode Characteristics                 |                   |                                     |      |      |      |      |
| Diode Forward Voltage                 | VSD               | VGS=0V , IS=1A , TJ=25℃             | -    | -    | 1.2  | V    |
| Maximum Body-Diode Continuous Current | IS                |                                     | -    | -    | 45   | A    |
| Reverse Recovery Time                 | Trr               | IS=10A, di/dt=300A/us, TJ=25℃       | -    | 10   | -    | nS   |
| Reverse Recovery Charge               | Qrr               |                                     | -    | 12   | -    | nC   |

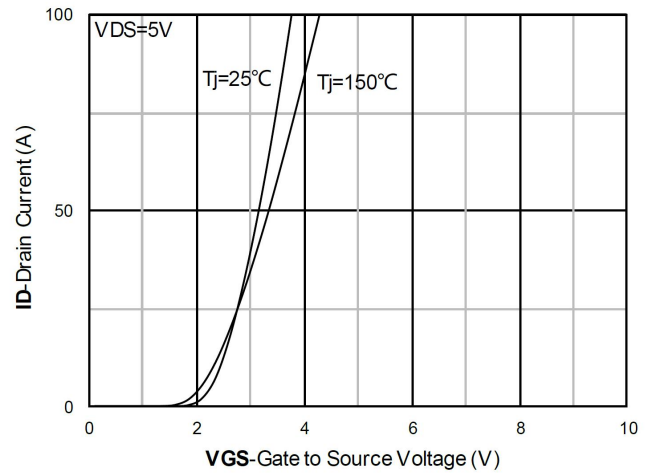
**Note :**

1. The test condition is  $V_{DD}=20V$ ,  $V_{GS}=10V$ ,  $L=0.5mH$ ,  $R_G=25\Omega$

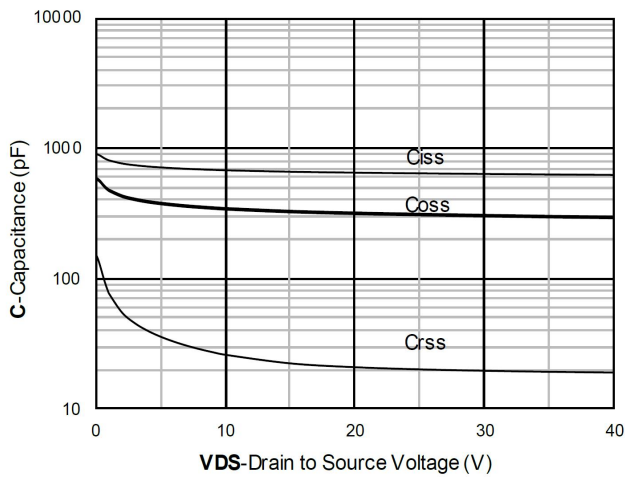
## Typical Characteristics



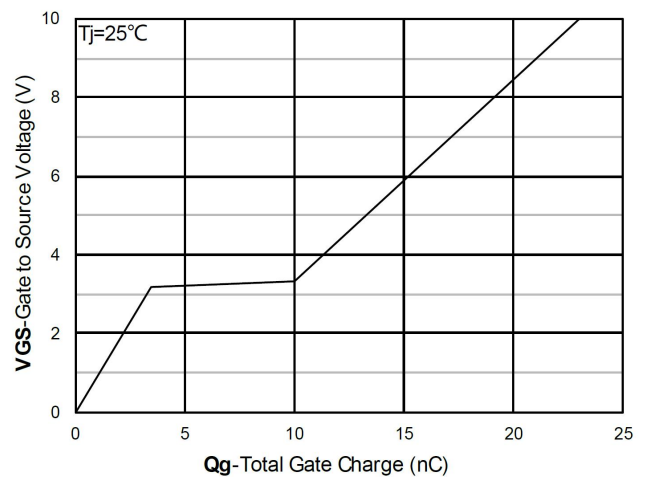
Output Characteristics



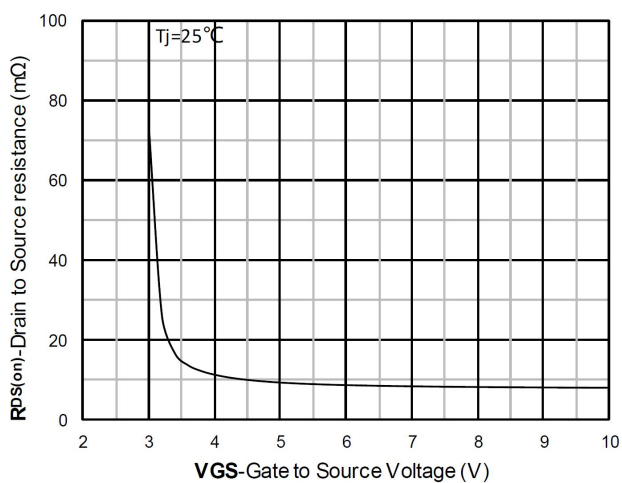
Transfer Characteristics



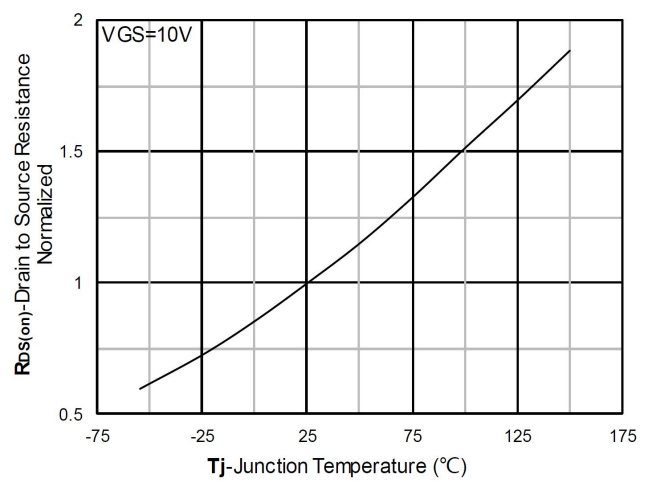
Capacitance Characteristics



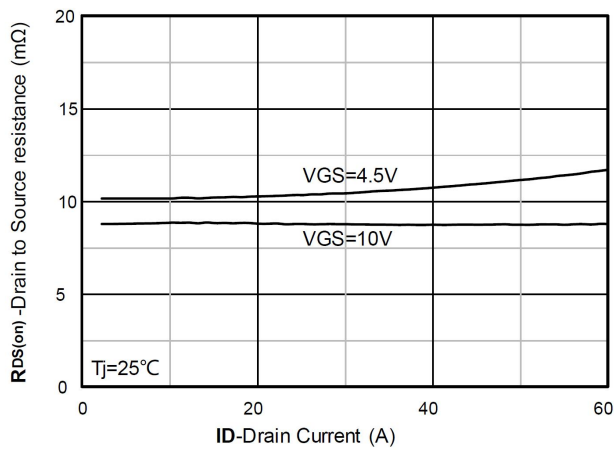
Gate Charge



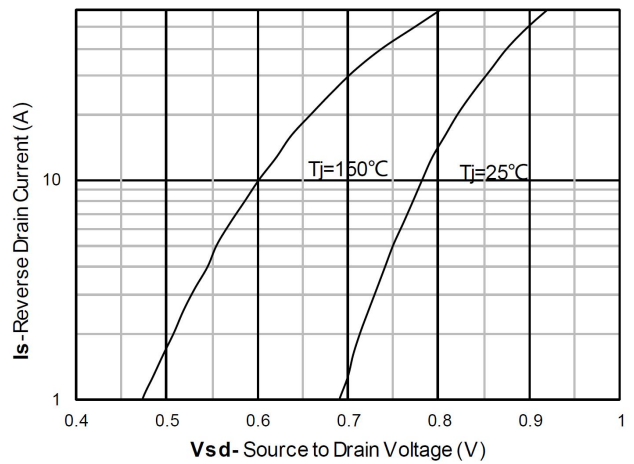
On-Resistance vs Gate to Source Voltage



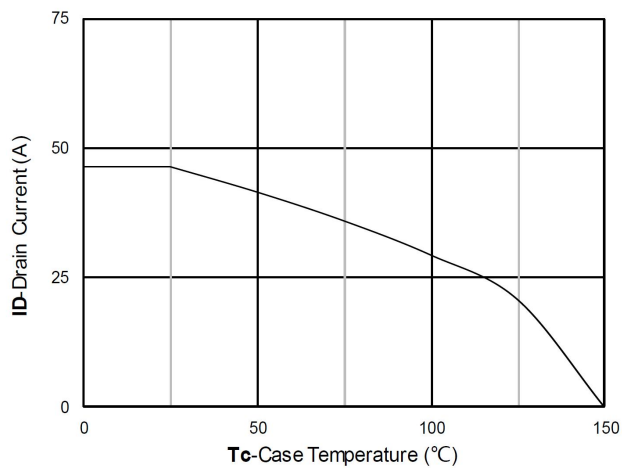
Normalized On-Resistance



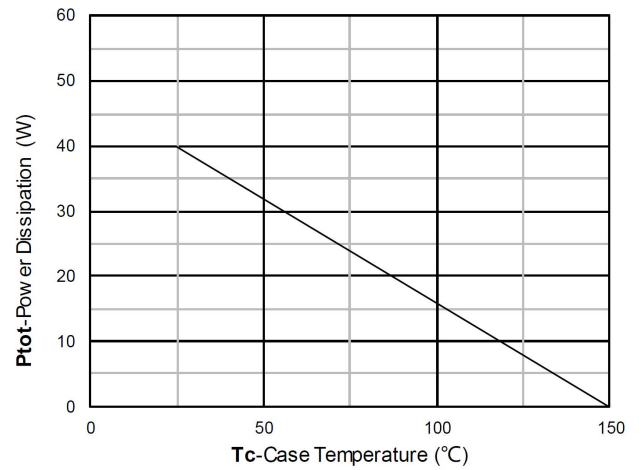
RDS(on) VS Drain Current



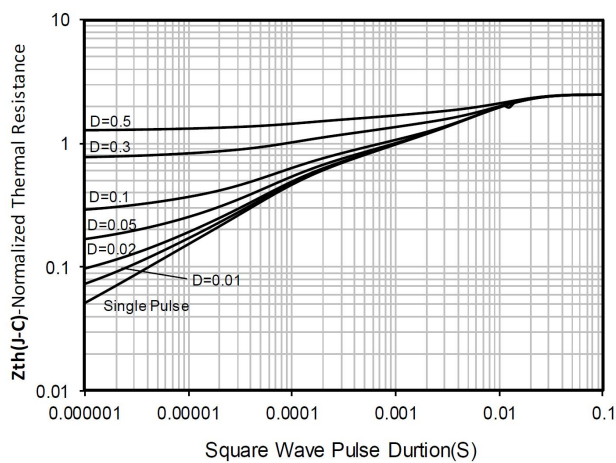
Forward characteristics of reverse diode



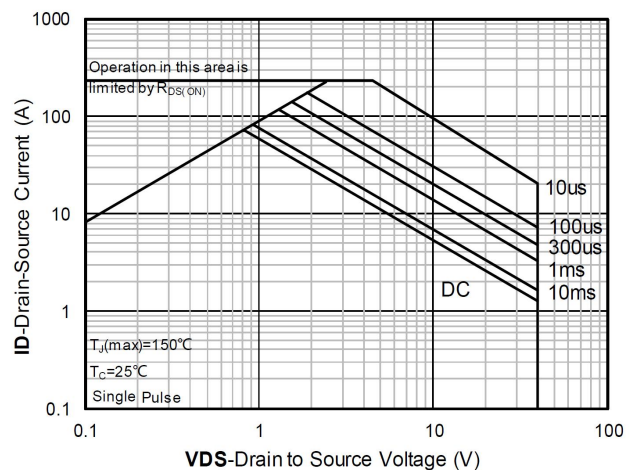
Current dissipation



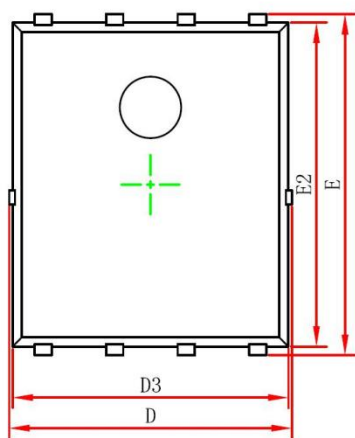
Power dissipation



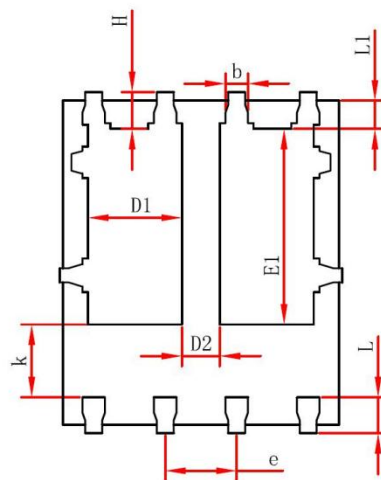
Maximum Transient Thermal Impedance



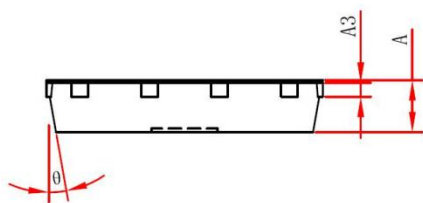
Safe Operation Area

**PDFN5X6-8L Package Information**


Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min.                      | Max.  | Min.                 | Max.  |
| A        | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3       | 0.254 REF.                |       | 0.010REF.            |       |
| D        | 4.944                     | 5.096 | 0.195                | 0.201 |
| E        | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1       | 1.470                     | 1.870 | 0.058                | 0.074 |
| D2       | 0.470                     | 0.870 | 0.019                | 0.034 |
| E1       | 3.375                     | 3.575 | 0.133                | 0.141 |
| D3       | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2       | 5.674                     | 5.826 | 0.223                | 0.229 |
| k        | 1.190                     | 1.390 | 0.047                | 0.055 |
| b        | 0.350                     | 0.450 | 0.014                | 0.018 |
| e        | 1.270TYP.                 |       | 0.050TYP.            |       |
| L        | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1       | 0.424                     | 0.576 | 0.017                | 0.023 |
| H        | 0.574                     | 0.726 | 0.023                | 0.029 |
| $\theta$ | 10°                       | 12°   | 10°                  | 12°   |